Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of Expanding Flexible Use of the 3.7 GHz to 4.2 GHz Band	GN Docket No. 18-122

Comments of Alaska Communications Internet, LLC

Alaska Communications Internet, LLC ("Alaska Communications") hereby responds to the Commission's Public Notice (the "Public Notice")seeking comment on its framework for evaluating opportunities for introducing new terrestrial services to share the C-band downlink spectrum (3.7-4.2 GHz) with existing licensees of satellite and terrestrial point-to-point microwave services.[1] As the licensee and applicant for numerous C-band earth station sites, Alaska Communications understands the vital role that C-band satellite services play in connecting isolated and otherwise vulnerable Alaska residents to educational and healthcare resources, unlocking economic opportunity, and enabling participation in the civic and cultural fabric of the state, our nation as a whole, and, indeed, the larger world.

In these Comments, Alaska Communications asks the Commission to exclude Alaska from any reallocation of the 3.7-4.2 GHz band for terrestrial mobile "5G" wireless broadband services. Incumbent satellite and terrestrial fixed microwave services in the 3.7-4.2 GHz band are used to deliver vital connectivity to remote areas of Alaska, and they would be difficult or impossible to replace. Not only is the 3.7-4.2 GHz band ill-suited to sharing between terrestrial mobile "5G" services and these incumbent uses, but Alaska's small population and low population density mean that there is not the same need for additional spectrum to support new terrestrial mobile 5G data services in Alaska that may exist elsewhere.

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[1] Public Notice, "Office of Engineering and Technology, International, and Wireless Telecommunications Bureaus Seek Comment for Report on the Feasibility of Allowing Commercial Wireless Services, Licensed or Unlicensed, to Use or Share Use of the Frequencies between 3.7-4.2 GHz, Notice and Opportunity for Public Comment under Section 605(b) of the MOBILE NOW Act," GN Docket No. 18-122, DA 18-446 (rel. May 1, 2018).

Background

The recently-enacted MOBILE NOW Act[2] requires the Commission, together with NTIA, to submit a report to Congress on the results of a "a report evaluating the feasibility of allowing commercial wireless services, licensed or unlicensed, to use or share use of the frequencies between 3700 megahertz and 4200 megahertz." The Commission's Public Notice seeks public comment on three questions the Report must address, as follows:

- How should we assess the operations and possible impacts of sharing on Federal and non-Federal users already operating in this band?
- How might sharing be accomplished, with licensed and/or unlicensed operations, without causing harmful interference to Federal and non-Federal users already operating in this band, and in which parts of the band would such sharing be feasible?
- What other considerations should the Commission take into account in preparing the 3.7- 4.2 GHz Report?[3]

The MOBILE NOW Act and this Public Notice also arrive in the midst of at least two other proceedings[4] in which the Commission is evaluating expanded terrestrial use of C-band frequencies (including 3.7-4.2 GHz) currently allocated by the Commission for non-Federal fixed-satellite ("FSS") (space-to-Earth) and terrestrial fixed (point-to-point) services.[5]

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2 *See* Consolidated Appropriations Act, 2018, Pub. L. No. 115-141, § 605(b), 132 Stat. 348 (2018), Division P, the "Repack Airwaves Yielding Better Access for Users of Modern Services (RAY BAUM'S) Act." Title VI of the RAY BAUM'S Act is the "Making Opportunities for Broadband Investment and Limiting Excessive and Needless Obstacles to Wireless Act" (known as the "MOBILE NOW Act").

3 Public Notice at 2.

4 *See Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Docket No. 17-183, Notice of Inquiry, FCC 17-104, 32 FCC Rcd 6373 (2017); Public Notice, *Petition of Broadband Access Coalition for a Rulemaking to Amend and Modernize Parts 25 and 101 of the Commission's Rules to Authorize and Facilitate the Deployment of Licensed Point-to-Multipoint Fixed Wireless Broadband Service in the 3700-4200 MHz Band*, RM-11791, Report No. 3080 (CGB rel. July 7, 2017).

5 47 C.F.R. § 2.106 (U.S. Table of Frequency Allocations).

Alaska Communications has a strong interest in this proceeding because it uses both FSS and terrestrial point-to-point microwave services extensively to enable vital telecommunications and broadband Internet access services in remote regions of the Alaska Bush.[6] For many Bush villages, often primarily home to Alaska Native communities, these FSS or terrestrial fixed services represent their only communications alternative. The Commission should thus report that new terrestrial mobile 5G services in the 3.7-4.2 GHz band should not be introduced in Alaska, in order to avoid disrupting these services.

Discussion

These Comments address the Bureaus' three questions in turn, as follows:

A. How should we assess the operations and possible impacts of sharing on Federal and non-Federal users already operating in this band?

Alaska Communications recommends that the Commission weigh a range of factors in evaluating the impact of sharing on the incumbent users of the 3.7-4.2 GHz band, specifically including: (1) the interference that new services will cause; (2) an assessment of the need for additional spectrum resources in the geographic area where the interference will occur; (3) the costs of mitigation to incumbent licensees; and (4) the availability of compensation for any necessary modifications, relocation, or cessation of incumbent licensee operations in the band. Based on these factors, Alaska Communications believes that it is clear that Alaska should be excluded from any introduction of new terrestrial mobile 5G services at this time.

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[6] Unlike Alaska's three largest population centers, and the surrounding rural communities, Alaska Bush communities are isolated geographically from infrastructure resources commonly available elsewhere in the state, and the nation as a whole. Most Bush communities cannot be accessed by road and are not connected to the state's power grid. To reach these communities, people, as well as goods and services, must arrive by plane, barge, snow machine, all-terrain vehicle, or other off-road transportation means. Communications services in these communities generally must rely on satellite or terrestrial point-to-point microwave transport links to Anchorage, Fairbanks, or Juneau.

1. Interference from New Services Will Be Severe

Multiple studies, conducted both in the U.S. and around the world, have shown that the propagation and interference characteristics of the 3.7-4.2 GHz band make the introduction of new terrestrial mobile 5G services devastating for the incumbent FSS and fixed services licensees. For example, SES Americom recently filed a study with the Commission showing a required separation of between 65 and 75 km between terrestrial mobile 5G base stations and incumbent satellite earth stations in Virginia with elevation angles ranging from 19 degrees to 39 degrees.[7] This result was consistent with a sharing study commissioned by Ofcom that found required separation in the U.K. of up to 70 km.[8]

The impact of this interference would be especially acute in Alaska. In Alaska, earth station elevation angles are lower – on the order of 15 degrees or less – than they are in the U.K. or Virginia, increasing the potential for interference between terrestrial mobile 5G and FSS services.[9] Moreover, FSS and terrestrial fixed services are the sole means of communication for over 170 primarily Alaska Native communities that dot the vast Alaska Bush. Scattered along Alaska's inaccessible coastlines, remote islands, and inaccessible interior, most of these communities lack wireline (copper or fiber) connections to global communications networks, and rely exclusively on FSS or terrestrial fixed services to meet their communications needs. In many of these

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[7] *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Docket No. 17-183, *Ex parte* Letter from Gerry Oberst, President, SES Americom Inc. (filed Mar. 2, 2018), Technical Annex at 6.

[8] Transfinite Systems Ltd., *Geographic Sharing in C-band - Final Report* (May 31, 2015), at 42, *available at:* https://www.ofcom.org.uk/research-and-data/technology/radio-spectrum/c-band-sharing (visited May 30, 2018).

[9] *Id.* at 39 (observing that "[l]ow elevation operation in the direction of a proposed IMT network will generate the worst case").

communities, services to the local school, library, or rural healthcare provider are delivered using satellite or terrestrial fixed links operating in the 3.7-4.2 GHz band. These services are supported by the Commission's Schools and Libraries ("E-rate") and Rural Health Care universal service support mechanisms because they are of particular public importance, and the Commission should take special care not to impair their reliability. In this way, continued reliable performance of the 3.7-4.2 GHz band for FSS and fixed microwave services not only improves economic, educational, and healthcare opportunities in these communities but, in a healthcare emergency, can mean the difference literally between life and death.

The effects of interference in the 3.7-4.2 GHz band are compounded because C-band satellites operate using hard-coded frequency pairs for uplink and downlink operations. Thus, interference at one location that precludes an earth station from receiving a particular downlink frequency in the 3.7-4.2 GHz band also affects a distant terminal's ability to transmit to that earth station on the corresponding uplink frequency in the 5.925-6.425 GHz band.

Any partitioning of the band between mobile 5G services and incumbent users would create additional spectrum "repacking" issues. High-power terrestrial signals anywhere in the band will saturate the earth station's low noise block ("LNB") downconverter and could preclude an FSS earth station licensees from using *any portion* of that band unless and until it replaces each LNB with one that does not receive the affected frequencies.[10] It would likely be necessary in many cases to replace the LNB downconverter completely with one that receives only the

[10] *See Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Docket No. 17-183, Comments of General Communication, Inc. (filed Oct. 2, 2017), at 12 (observing that, "the presence of even small amounts of external, intentional radiator energy can easily overwhelm the input signal limits of a [low-noise amplifier] and saturate it," impairing the ability of the earth station to effectively receive any signal).

unaffected portion of the band. And, with less spectrum available for the incumbent FSS and fixed services, there may be locations where it is no longer possible to coordinate all of incumbent licensees' services.

2. There Is Less Need for Additional Mobile Broadband Spectrum Resources in Alaska than There Is Elsewhere

In Alaska, spectrum resources for terrestrial mobile services are far less constrained than they are in the nation's large urban centers, where 5G services using newly-allocated spectrum, will make their debut. Alaska comprises roughly one-sixth of the nation's total land area, but it has a population of roughly 740,000. Of that total, about 300,000 – some 40 percent – live in Anchorage, the state's largest population center, with a population density of about 171 persons per square mile.[11] Therefore there is far less need for the "densification" of mobile broadband networks in Alaska, let alone new 5G spectrum, than there is in the nation's large urban centers, where population densities can range up to 4,000 persons per square mile or higher.[12] Furthermore, there is still great potential for existing mobile broadband data providers to expand current capacity by "densifying" networks using existing spectrum allocations, rather than expanding into new bands.

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[11] *See* United States Census Bureau, Quick Facts: Anchorage Municipality, Alaska and Alaska, *available at:* https://www.census.gov/quickfacts/fact/table/anchoragemunicipalityalaska,AK/PST045217 (visited May 30, 2018).

[12] *See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 17-69, Twentieth Report, FCC 17-126, 32 FCC Rcd 8968 (2017), at ¶ 45 (citing, as evidence of densification, the fact that, between April 2016 and April 2017, the "average number of tower sites per county increased from 584 to 815 in the most densely-populated counties, with a population density of over 4000 people per square mile").

3. Costs of Mitigation Will Be High

Given the required separation distanced between terrestrial mobile 5G base stations and incumbent satellite earth stations and fixed microwave links that use the 3.7-4.2 GHz band today, there appears to be little opportunity for sharing, other than through sufficient physical or spectral separation of the services. New terrestrial mobile 5G operations would otherwise create interference that would cause harmful interference to reception of satellite downlink transmissions and thereby interrupt service to customers purchasing the associated services. Some of these costs are discussed as follows:

Interference Mitigation. C-band gateways and customer terminals have fixed capabilities set to particular frequencies that cannot be easily adjusted among C-band, Ku-band or other FSS bands. Reallocation of the 3.7-4.2 GHz band, either outright or through "sharing" rules that effectively preclude continued use of the band by other services, would likely obligate incumbents to abandon the C-band and replace all of their associated equipment. Needless to say, this would be an extremely costly and time-consuming process.

Even a partitioning of the band between terrestrial mobile 5G services on the one hand, and the incumbent FSS and fixed microwave services that operate today on the other, would impose substantial costs. As discussed above, LNB saturation issues would necessitate the costly replacement of every affected LNB downconverter, lest high-power terrestrial 5G mobile base stations *anywhere* in the C-band downlink spectrum prevent the *entire band* from being used for satellite operations.

These efforts would be particularly costly in Alaska. Remote satellite earth station customer terminals are invariably located in remote areas of the state where Alaska Communications does not have any permanent presence of operations, maintenance, or repair

technicians, meaning that, to change or adjust any equipment at a remote village in the Alaska Bush, there are considerable mobilization costs. Maintenance and repair calls that could be accomplished in hours in the lower 48 states may consume days or weeks in Alaska, requiring travel by airplane, boat, barge, all-terrain vehicle, or snow machine to locations that are inaccessible by road, when weather permits access at all. Air freight charges for any necessary equipment, parts, or tools drive costs still higher.

Relocation of Facilities: Gateway earth station hub facilities are typically large installations with multiple satellite transmit and receive antennae. They are located at sites chosen after extensive analysis of the spectrum environment and careful coordination with other licensees. Environmental protection, historical preservation, zoning, permitting, land use, and other planning processes are lengthy and costly to complete, and the specialized equipment is costly to purchase and install.

In the case of Alaska Communications, its earth station hub is located in Anchorage, where it can connect to its core terrestrial communications network in Alaska, as well as undersea cables that reach the lower 48 states. Although Anchorage is not a particularly dense urban area, and existing spectrum allocations appear sufficient to meet its 5G mobile broadband needs for the foreseeable future, Anchorage is likely to be the first market in Alaska where terrestrial mobile 5G services would be introduced. Introduction of these new services in the vicinity of this hub would likely require the physical relocation of these capital-intensive facilities and the transfer or replacement of specialized staff. That process of physically relocating the multiple large earth station antennae present at a single gateway, as well as the associated specialized staff and equipment, could easily take years, with costs running into many millions of dollars.

4. A Compensation Mechanism Should Available to Incumbent Licensees

In evaluating whether to permit introduction of new terrestrial 5G mobile services in the 3.7-4.2 GHz band, and in light of the extraordinary costs discussed above, the Commission should consider a mechanism to compensate incumbent licensees for the costs they will incur to mitigate interference, relocate their facilities or earth station operations, or abandon their businesses altogether. Such compensation would ensure that the decision to undertake the transition to terrestrial mobile 5G broadband services in this band is, in fact, economically efficient: if the highest and best commercial use of this spectrum is to provide terrestrial mobile broadband services, then it will prove economically rational to compensate the incumbents to vacate the band.

Having received the licensed right to use the specified spectrum for a defined term, a licensee may reasonably expect that license to provide sufficient predictability and certainty during that term to permit it to invest capital, develop business, and incur contractual obligations with customers. If new entrants or new technologies have emerged that create superior public benefits or opportunities for economic growth, then the Commission should create a transitional mechanism following the expiration of that license term, or compensate the incumbent for the costs it incurs to make way prematurely for the new entrants, including the costs of abandoning, relocating, or modifying sunk capital facilities, and breaking or restructuring their contractual commitments.

The Commission has established precisely these sorts of compensation mechanisms in similar circumstances previously. For example, when the Commission reorganized the 800 MHz band to accommodate the communications needs of first responders and other emergency services, it established a Transition Administrator to oversee the distribution of funds for service

reconfiguration and spectrum relocation costs incurred by incumbents.[13] More recently, the Commission designed its Broadcast Incentive Auction according to this principle, under which mobile broadband service providers and UHF broadcasters participated in an integrated "forward" and "reverse" auction process, in order to identify opportunities for economically efficient reallocation of 600 MHz spectrum. The auction proceeds will both compensate broadcasters that return some or all of their broadcast spectrum usage rights and reimburse remaining broadcasters and multichannel video programming distributors ("MVPDs") for their costs of more efficiently "repacking" into alternative broadcast channels, while also yielding proceeds to be deposited in the U.S. Treasury.[14] As the Commission explained, "Our central objective in designing this incentive auction is to harness the economics of demand for spectrum in order to allow market forces to determine its highest and best use."[15] The Commission should similarly establish a

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[13] *See, e.g., Improving Public Safety Communications in the 800 MHz Band*, WT Docket No. 02-55, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, FCC 04-168, 19 FCC Rcd 14969 (2004), at ¶¶ 177-178 ("Band reconfiguration will be costly . . . . Under the band reconfiguration plan, the principal cost component will be borne by Nextel, which will pay for all channel changes necessary to implement the reconfiguration. Nextel is obligated to ensure that relocated licensees receive at least comparable facilities when they change channels.").

[14] *See generally Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Report and Order, FCC 14-50, 29 FCC Rcd 6567 (2014) ("*Broadcast Incentive Auction Report and Order*"), at ¶¶ 25-26 (describing forward and reverse auctions), ¶ 35 (describing procedures to reimburse costs reasonably incurred by television stations that are reassigned to new channels in the repacking process, as well as by MVPDs to continue to carry such stations); *Post-Incentive Auction Transition*, MB Docket No. 16-306, Public Notice, "Incentive Auction Closing and Channel Reassignment Public Notice," DA 17-314, 32 FCC Rcd 2786 (2017), at ¶ 2 ("Proceeds from the forward auction, *i.e.*, winning bids net of credits for rural service providers and small businesses, total $19,318,157,706, with 50 bidders placing winning bids for a total of 2776 licenses. The winning bids in the reverse auction total $10,054,676,822. After covering reverse auction winning bids, reimbursement payments of up to $1,750,000,000 for eligible broadcasters and MVPDs, and costs of conducting the incentive auction, forward auction proceeds totaling at least $7,306,480,884 will be used to reduce the Federal deficit.").

[15] *Broadcast Incentive Auction Report and Order* at ¶ 2.

mechanism to compensate incumbents 3.7-4.2 GHz licensees, in order to ensure that the Commission has indeed identified the "highest and best use" of this valuable spectrum.

B. How might sharing be accomplished, with licensed and/or unlicensed operations, without causing harmful interference to Federal and non-Federal users already operating in this band, and in which parts of the band would such sharing be feasible?

For the reasons discussed above, Alaska Communications sees no feasible opportunity to introduce terrestrial mobile 5G services in the 3.7-4.2 GHz band on a "shared" basis with existing users. Rather, to the extent that the Commission pursues any opportunity to introduce terrestrial mobile 5G services in this band, it will need to do so through partitioning, either of geographic territory or of the spectrum itself. Alaska Communications reiterates that, based on the factors discussed above, the existing allocation of the 3.7-4.2 GHz band for FSS and fixed services alone provides greater public benefits in Alaska than would an incremental allocation of spectrum for terrestrial mobile broadband services, and that existing allocation should be preserved in the state.

Indeed, around the world, regulators have concluded that there is no feasible means of "sharing" this band between the incumbent FSS and fixed users, on the one hand, and new terrestrial 5G mobile services on the other. For example, in its recent Statement regarding introduction of terrestrial mobile services in the C-band in the U.K., Ofcom concluded that such sharing presented overwhelming challenges,[16] such that, "nationwide deployment of future mobile services including 5G could not coexist with the coordination approach and current benchmark spectrum quality provided to registered [satellite earth station and fixed link] users of

[16] *See* Ofcom, *Statement on Improving Consumer Access to Mobile Services at 3.6 GHz to 3.8 GHz* (rel. Oct. 26, 2017) ("Ofcom Statement"), at ¶ 2.32 (finding that UK-wide 5G macrocell network deployment "would be likely to undermine benchmark spectrum quality for existing registered satellite earth station or fixed link band users"), *available at:* https://www.ofcom.org.uk/__data/assets/pdf_file/0019/107371/Consumer-access-3.6-3.8-GHz.pdf).

the band."[17] Similarly, in considering use of C-band spectrum for terrestrial mobile 5G services, Singapore's Infocomm Media Development Authority recognized two primary options: either a full migration of all satellite users out of the affected spectrum band, or a partition of the band to preserve part of it for existing users and make part of it available for new 5G entrants.[18]

C. What other considerations should the Commission take into account in preparing the 3.7- 4.2 GHz Report?

At the World Radiocommunication Conference 2015 ("WRC-15"), the International Telecommunications Union ("ITU") acknowledged the need for additional study regarding the potential for sharing and coexistence of terrestrial mobile, fixed, and satellite services in the C-band. With the Commission's Report to Congress due just as WRC-19 is slated to begin, the Commission should incorporate the findings of any C-band studies that will be discussed at that meeting.

Furthermore, the Commission should grandfather existing FSS earth station sites, and permit future earth station deployment utilizing the 3.7-4.2 MHz band on a protected first-in-time basis. That is, if the Commission allocates that band for terrestrial mobile 5G services, it should continue to permit licensing of new FSS earth stations where doing so will not interfere with existing 5G deployment. Such a rule will incentivize 5G providers to build out their networks quickly following the Commission authorization. If on the other hand, deployment lags, then satellite service providers should not be precluded from siting new earth stations that may become necessary to meet demand for their services in areas where they will not interfere

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[17] *Id.* at ¶ 2.34; *see also id.* at ¶ 3.16 (finding that, "enabling nationwide deployment is likely to deliver significant benefits which would not be delivered if we were to maintain the current coordination mechanisms to provide benchmark spectrum quality for registered users").

[18] Singapore Infocomm Media Development Authority, Consultation Paper, "5G Mobile Services and Networks (rel. May 23, 2017), at ¶ 43, *available at:* https://www.imda.gov.sg/-/media/imda/files/inner/pcdg/consultations/consultation-paper/public-consultation-on-5g-mobile-services-and-networks/5g-public-consultation.pdf.

with then-existing terrestrial 5G operations. Once licensed, those earth stations should be protected to the same degree, and for the same reasons, as those that currently exist.

Conclusion

For the foregoing reasons, the Commission should report to Congress that sharing of the 3.7-4.2 GHz band by terrestrial mobile 5G services operating in the same geographic areas as incumbent FSS and fixed services is infeasible. To the extent that the Commission seeks to introduce new services in this band, it should put in place safeguards to protect incumbent operations, and establish a compensation mechanism to reimburse incumbent operators for their costs of accommodating the new 5G entrants.

Respectfully submitted,

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